Preparation and characterization of chemically deposited Cu4SnS4 thin films

ABSTRACT

Thin films of Cu4SnS4 were grown by chemical bath deposition technique. The deposition parameters such as bath temperature (50 °C), deposition time (120 min), electrolyte concentration (0.05 M) and bath pH (pH 1.5) were optimized to obtain good quality of films. The thin films were characterized using X-ray diffraction and atomic force microscopy in order to study the structural and surface morphological properties. The band gap energy, transition type and absorption properties were determined using UV-Vis Spectrophotometer. The X-ray diffraction analysis showed the presence of polycrystalline in nature and the most intense peak occurred at 2q = 30.2° which belongs to (221) plane of Cu4SnS4. Atomic force microscopy image reveals that grains are uniformly distributed over the surface of substrate. An optical absorption study shows the presence of direct transition with band gap energy of 1.6 eV.

Keyword: chemical bath deposition; Semiconducting material; Solar cells; Thin films